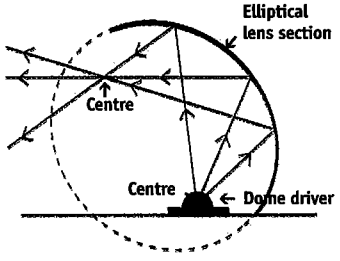
ROOM COMPENSATION

The overall tonal balance of any hi-fi system is largely a function of the speakers, their interaction with the character and dimensions of the listening room, and also where they're placed within that room. Uniquely, the Beolab 5 deliberately goes out of its way to address these issues, and should deliver a consistent result largely irrespective of the characteristics of the room and its placement therein.

This is a two-pronged attack. Elliptical 'acoustic lenses' control the distribution of both mid and high frequencies. These avoid both the floor and ceiling reflections that interfere with stereo image precision, and also reflection-induced colorations caused by proximity to the wall behind the speakers.

To explain how this works requires a little geometry. An ellipse is a 'stretched' circle, with two centres rather than one. Crucially, the combined radii from both centres to the ellipse is always constant (see diagram below). Place a drive unit at one of the centres, and the sound reflecting off all parts of the ellipse will always pass through the other centre. Furthermore, because the path length remains constant, phase coherence will also be maintained.

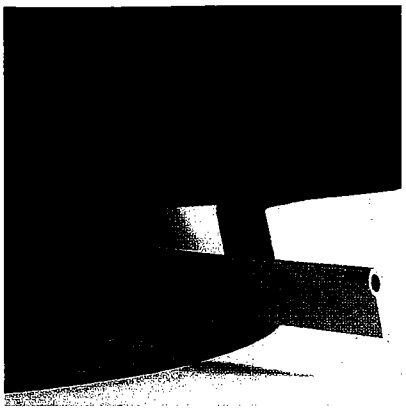


Elliptical acoustic lens

The other feature uses digital signal processing (DSP) to counter the peaks and troughs which are caused by interaction between the drive units and the room modes through the bass region. Bang & Olufsen has developed a technique to 'read' the modal structure of a listening room by comparing two nearfield measurements, one of them very close to the subwoofer, the other a few centimetres further away. The radiation resistance seen by the bass driver is calculated, and thence the digital filtering needed to create an even average sound pressure throughout the listening room.

That said, our normal far-field, in-room-averaged measurements still show significant evidence of room-mode peaks and troughs. Nevertheless, the balance is smoother than most through the bass region, much flatter than in the 'uncalibrated' state, and also impressively consistent irrespective of where the speakers happen to be placed within the room.

The overall balance is a little strong through the sub-200Hz bass decade, and a little shy through the midband decade (200Hz-2kHz). The full range from 200Hz up to the extreme treble is notably flat and seamless, however, and only marginally affected by wall proximity (though free space siting is still preferable here).



Above left: A motorised microphone pokes out from the speaker's base during set-up.
Above right: Connections include analogue and digital phono inputs, IEC mains and a 'sync link'.

symmetrically in some omni-directional speaker designs, but perhaps the best known recent example here in Britain was Canon's asymmetric 'Wide Imaging Stereo' designs, available through the early 1990s.

However, the clever bit here is the use of elliptical sections to form the reflective surfaces. B&O engineers have been working alongside patent-holders Sausalito Audio Works, a US Pro-Audio operation, and this specific variation on the theme would seem to offer substantial advantages both in terms of focus precision and phase coherence over the flat-surface reflectors that are normally found (see 'Room Compensation' sidebar).

The elliptical 'mirror/lenses' here are shaped to cover a 180° semicircle. Nearly all the driver output is therefore directed forward, increasing the efficiency in the listening zone, and also creating a speaker whose output is substantially independent of rear-wall proximity – it effectively creates its own 'rear wall'. Efficiency is further improved because the sound is focused into a limited vertical 'window'.

What happens at the bass end is even more radical. This is an active digital speaker, with powerful built-in amplification and DSP (digital signal processing) to counter the effects of room modes. A number of companies are currently pursuing a similar goal, but B&O's implementation is exceptionally neat and clever. Carrying out the equalisation is the relatively easy bit. The difficult task is working out what filtering to apply to make the set-up procedure user-friendly, and it is here that the Beolab 5 solution is particularly elegant.

The whole set-up process is automated, so just pushing on the top 'mushroom' starts it going. A complex test signal sequence is stored in a memory chip, while a measuring microphone is fitted to a motor-driven metal rod located between the floor and the downward-firing bass driver. There's no attempt to equalise the speaker for a particular listening zone, but rather to achieve a broad average that smooths out the more extreme variations.

A B&O subsidiary company called ICEpower makes very compact digital power amp modules for general sale, and each Beolab 5 uses four of these – two at 1,000 watts for the low-bass and mid-bass, plus two at 250 watts for the mid and treble. The very high powers feeding the bass drivers are needed to provide two stages of equalisation. One is needed to compensate for mounting the drivers in tiny sealed enclosures – 29 litres for the 380mm and five litres for the 165mm unit – then the +10/-15dB boost 'n' cut of the room mode EQ filters must also be taken into account. The high (93 per cent) efficiency of the power amp modules means the enclosures can be completely sealed with no need for special cooling arrangements.

The speaker accepts either analogue (phono socket) or digital (SPDIF) inputs, converting the former with a 24-bit/96kHz A-to-D converter. Processing is handled by a 32-bit Sharc 2 DSP, while a 512Kb Flash-ROM provides for future upgradeability.

Weighing an exceedingly hefty 61kg, the speakers arrived strapped to wooden pallets, but proved easy enough to unpack. Although it was possible to apply mains power and perform the bass equalisation procedure (which takes about 30 seconds for each speaker), a B&O remote handset is needed to go from stand-by to operational mode, so a frustrating hiatus ensued. In practice of course, most B5s will find themselves used with B&O systems, so a relevant handset will usually be readily available.

The speaker electronics include

built-in remote volume controls, which will normally be used in a B&O system context. These can also be by-passed for connection to a regular hi-fi system, as was done for this review, when the speakers were primarily driven from a Naim NAC 552 pre-amplifier.

SOUND QUALITY

Prior to actually seeing the speaker itself, one of the first elements of a visit to the Beolab 5 factory was a blind listening session in a domestic-size 'standard' room. The immediate impression, with absolutely no knowledge of what one was listening to, was of the speaker's exceptionally precise and detailed stereo perspectives, and its superbly even-handed neutrality.

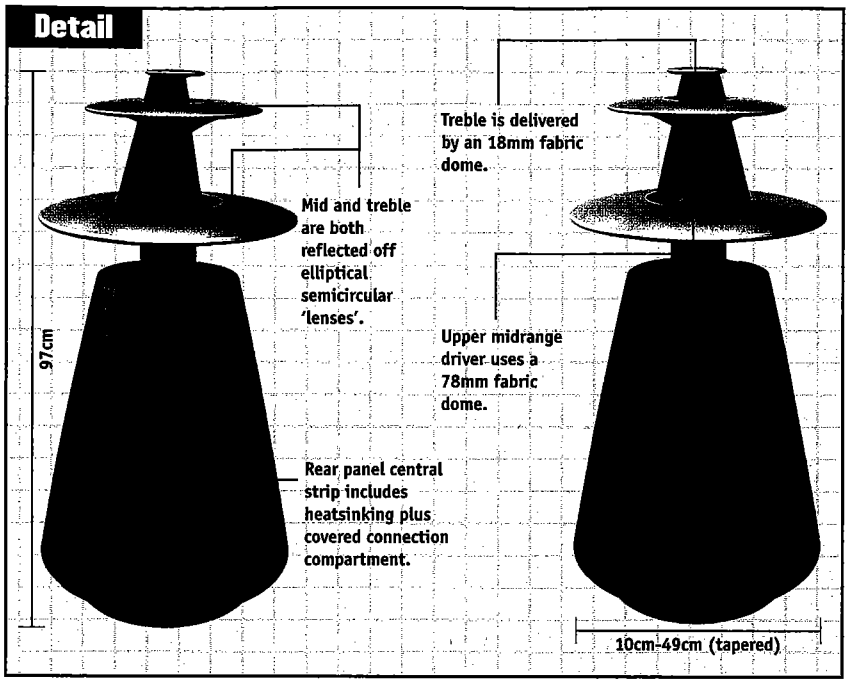
Back at home base some weeks later, precisely the same impressions came through just as vividly. The obvious conclusion is that the 'lens' system used here is extremely effective, and does indeed work 'as advertised'. Furthermore, there seems to be no obvious down-side to the use of reflectors. Past experience with other reflector systems led me to anticipate a measure of coloration, though that wasn't at all the case with this advanced implementation.

Indeed, coloration was exceptionally low throughout the audio band, and this speaker is unquestionably among the most neutral and least coloured on the market. Its cleverest trick, however, is simply the way it seems to 'disappear', acoustically speaking. One simply isn't aware of the location of the speakers themselves – only of the precisely detailed and well-focused soundstage, with all the instruments and voices of a recording portrayed with unusually natural perspectives and proportions.

Such exceptional imaging is more commonly found among small loudspeakers, where it inevitably also involves modest bass weight and extension. However, that's definitely not a limitation with these Beolabs. Indeed, the bass alignment – no doubt assisted by the ABC mode-compensation system – is just about as good as it gets, imparting magnificent weight and power whenever the program material requires, while neatly avoiding the mid-bass thump and thickening that all too often accompanies attempts to deliver deep bass output.

And there's none of the 'woody' or 'boxy' colour and consequent 'thickening' of textures that tends to occur with large conventional enclosures. The B5's relatively small and asymmetric enclosure in heavily rib-reinforced structural plastics isn't totally free from vibration, but it doesn't seem to have any obvious sonic signature.

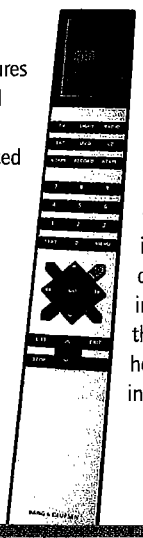
Even a notorious 'thumper' like Wyclef Jean's *Carnival* (check track 18, *We Trying To Stay Alive*) comes through crisp and clean – and very, very loud if your nerve holds. Mine eventually cracked, when I feared for the structural integrity of my suspended floor – "No Subwoofer Necessary" should be printed on the B5's carton.


Detail
Treble is delivered by an 18mm fabric dome.
Mid and treble are both reflected off elliptical semicircular 'lenses'.
97cm
Upper midrange driver uses a 78mm fabric dome.
Rear panel central strip includes heatsinking plus covered connection compartment.
10cm-49cm (tapered)

"The conclusion is that the 'lens' system used here is extremely effective."

Surprisingly perhaps, in view of the openness and genuine neutrality of the tonal balance, the sound showed little if any aggressive tendencies, even when playing the system at very high levels. Perhaps this is a consequence of the active drive, and consequent avoidance of a passive crossover network, or maybe it's a function of the distribution control and consistency.

Sound distribution is a crucial factor responsible for the different character of loudspeakers. The opposite extremes are represented by omni-directional designs at one end of the spectrum, and dipole panels at the other. A really clever trick of the Beolab 5 is that it seems to combine much of the 'in-the-room reality' of the former with the image precision of the latter. It's perhaps not quite the best of both worlds, but it's probably just about the best of all compromises here.



This speaker has a whole lot going for it sonically, but does fall a little way short of best audiophile practice in terms of time coherence and dynamic expression. It won't, for instance, run shivers up your spine in the manner of a triode-driven full-range horn system. Nor does it highlight the innately distinctive characters of our various analogue and digital sources in the manner of a serious 'high-end' system.

Its appeal is more to the cerebrum than the emotions, and its strengths lie more in understatement and discretion than in drama and tension. No loudspeaker in our experience is more willing and able to 'disappear' sonically from the proceedings, leaving just the sound of music hanging there in the air. Few loudspeakers have such a small 'sonic signature', and none of those that do combine it with the exceptional bass extension encountered here.

Although the in-room bass compensation seemed rather coarser and less effective than might have been hoped, the most important feature of this revolutionary loudspeaker is that its excellence should be fully and consistently realised irrespective of the room in which it is used. And that unquestionably represents a true reinvention of the loudspeaker. **HFC**

Paul Messenger

VERDICT

SOUND >> 84%

FEATURES >> 98%

BUILD >> 90%

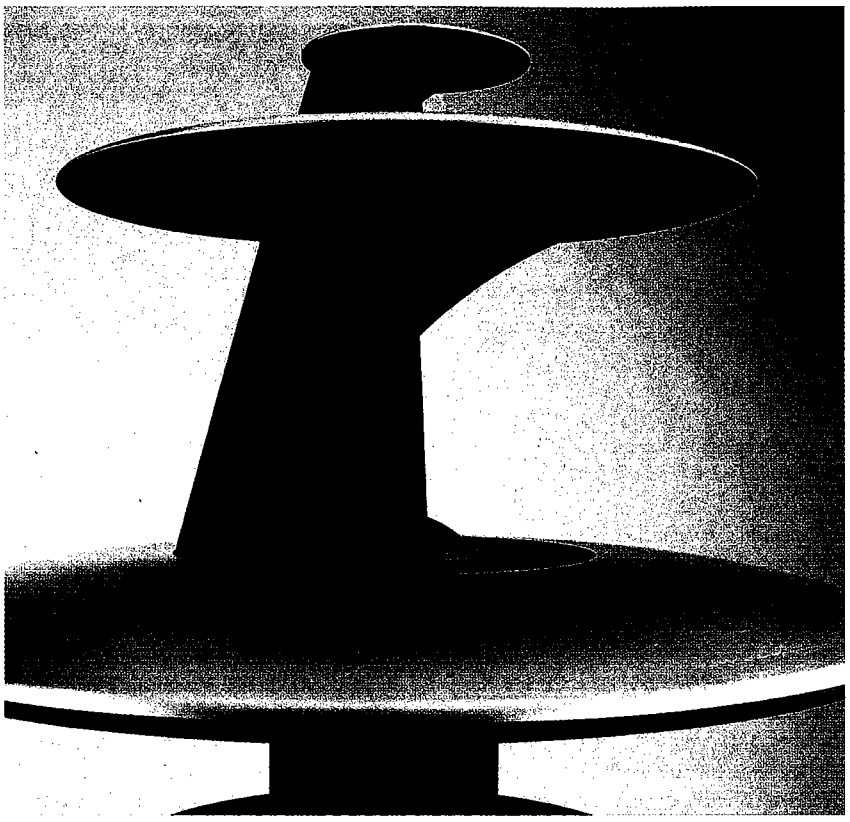
VALUE >> 69%

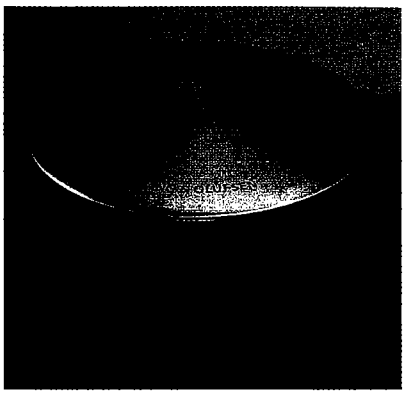
PRO
This stylish, physically and sonically discreet loudspeaker delivers superb stereo imaging, powerful bass and a notably open and neutral midband, irrespective of room siting and acoustics.

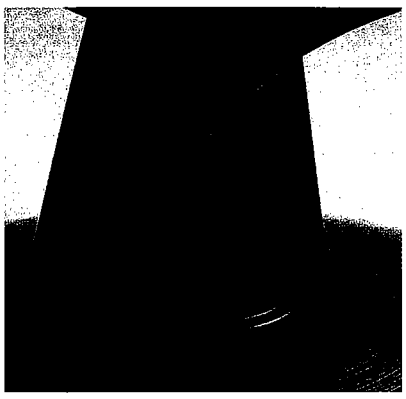
CON
Lacks the highest audiophile standards in dynamic tension and transparency. Bass mode compensation is a tad coarse.

A true revolution in loudspeaker design, B&O's Beolab 5 might not appeal to extreme audiophiles, but delivers superbly even and deep bass, fine overall neutrality, very low coloration and exceptional stereo imaging, consistently and essentially independent of its environment.

HI-FI OVERALL SCORE >>







DANISH DALEKS

The most radical and complex loudspeaker ever devised ought to put B&O back on the hi-fi map

PRODUCT Bang & Olufsen Beolab 5
TYPE Active floorstanding loudspeaker
PRICE £10,000 per pair
KEY FEATURES Size: 97x10-49cm ● Weight: 61kg ● Active drive: 2x1,000W + 2x250W ● Room-mode compensation ● Lens-controlled mid/treble dispersion
CONTACT ☎ 0118 969 2288 🌐 www.bang-olufsen.com

Bang & Olufsen is one of the grand old names of world hi-fi, founded way back in 1925, though in more recent years the company has been successfully carving out its own niche as a premium AV brand, applying a distinctive combination of decent performance with very stylish design and ergonomics to both audio and video products.

To say it has distanced itself somewhat from the specialist hi-fi sector during this period is true enough – most B&O sales are now made through 'one make' outlets. But it would be a mistake to underestimate the very considerable engineering skills and resources at the disposal of this 3,000-strong company.

Many of these have gone into creating this extraordinary Beolab 5, which is unquestionably the most radical, innovative and complex loudspeaker ever devised and put into production. It sells for a very substantial £10,000 per pair, but for that you also get several thousand (!) watts of amplification, plus some very clever digital signal processing.

The styling itself is very striking, its conical shape owing something to the Dalek school of industrial design, yet that curious and complex shape actually adheres closely to the principles of form-follows-function. One criticism of recent B&O speaker designs has been their use of multiple arrays of tiny drive units, in order to create super-slim shapes. However, the Beolab 5 goes to the opposite extreme, its cone shape allowing an enormous 380mm bass driver to be mounted in the base, pointing downwards.

Let's start with the outline spec. Finished in matt black with polished aluminium highlights, it stands around a metre high, though the tapering shape makes it look rather smaller. The underlying cone shape is interrupted by three silver-surfaced discs of different sizes, plus a narrow 'neck'. It's a four-way, four-driver design, the 380mm bass driver handing over to a 165mm unit for upper bass/lower mid, then a 78mm fabric-dome upper midrange, and finally an 18mm fabric-dome tweeter. These are all actively driven by built-in power amps which supply 2,500 watts of amplification for each speaker.

If that outline sounds intriguing enough, the true technological originality here lies in two key features that are genuinely unique. One provides close control over the directivity of mid and high frequencies, in order to deliver superior stereo image definition irrespective of where the speakers are sited. The other very clever technique both measures and equalises out the variations in bass output caused by the various modes created through interactions between loudspeaker and room.

B&O's extensive controlled listening test researches have found that the best way of achieving the most precise stereo imaging is to avoid floor and ceiling reflections as far as possible. The technique that achieves this uses upward-facing midrange and treble drivers, directing the sound forward towards the listening area using carefully shaped elliptical acoustic 'lenses'.

The use of reflectors as 'acoustic mirrors' is not in itself novel – many examples could be quoted, going way back to companies like Lowther and Wharfedale in the mono era. The approach is still often encountered ▶